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(54) Information transfer method using a pointing device

(57) In the information transfer method the information (I) is collected in the memory (55) of a pointing pen (51). A selected point on the display (43) is pressed with the tip of the pen (51), whereby a frequency change of the resonant circuit (42/52) indicates the contact, and a change in the resonance signal's strength in the receiving circuit determines the position of the pen. Then the oscillation of a second resonant circuit (43/53) is modulated with the information (I) in the memory. The received and demodulated (47) and possibly otherwise processed (48) signal is then presented on the display (43). With this method the user can transfer scanned information directly to the display of a pen computer or a mobile phone for further processing.

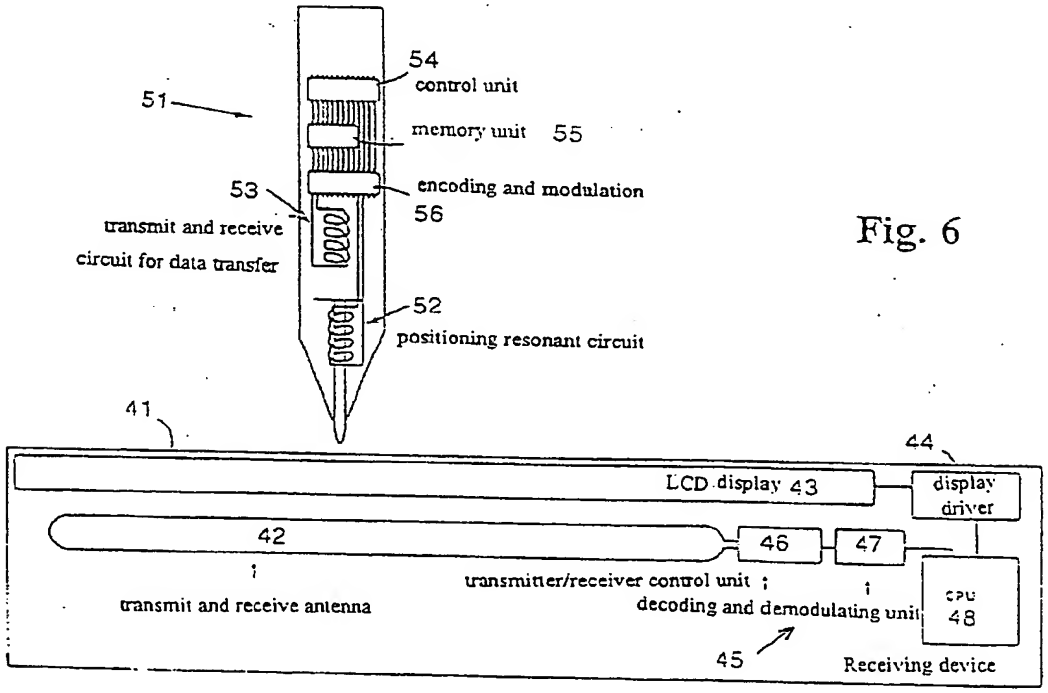

Fig. 6

EP 0 718 750 A1

Description

The invention relates to apparatus and method for transferring information between electronic apparatus.

In the development of small size portable data processing and communications equipment we are repeatedly faced with the problem how to realize flexible, versatile and user friendly data entering. For instance present day notebook microcomputers and mobile phones have comparatively small displays, and the keyboard sizes are very limited. Thus it will be a slow and cumbersome process to enter data in these devices, so that in practice only simple and short messages can be transferred through the user interface.

Different solutions to the above problem have been found and also put into use. Such solutions are presented e.g. by the user interfaces based on a touch screen. Different types of touch screens were discussed in the Finnish computer paper PROSESSORI, n:o 1/94, p. 31 to 33 "Kosketusnäytöllä helpommin" ('Easier with a touch screen'). The article mentions analog methods based on capacitive, resistive, and force measurement techniques. Of the matrix methods the article mentions infrared, acoustic and possibly also resistive contact detection. This article, however, discusses touch screen applications primarily for larger monitors based on the cathode ray tube technology. The enclosed figure 1 shows how in principle a certain point P on the display can be selected with the finger H, and how changes in the capacitance are detected in the horizontal and vertical directions by the display's detection circuits S, which then produce a signal to be processed by the electronics of the display device.

For portable applications we know e.g. so called pen computers or PDA devices (Personal Digital Assistant). On the market there are devices such as Apple Newton MessagePad, Sharp ExpertPad, or Casio XL-7000. These are microcomputers which easily fit in the hand and have no conventional keyboards, but data is entered by writing normal handwriting with a special pen on the touch screen of the device. Alternatively a keyboard picture corresponding to a standard keyboard may be activated on the device display, whereby the key positions are pressed with the tip of the pen. Then the display is realized by liquid crystal or LCD techniques, whereby the input section comprises a transparent digitizing layer over the display layer. The digitizing layer comprises for instance a plurality of digitizing points which are located in a matrix, and which as a result of a contact generate a physical response corresponding to the point of contact. The response is transformed into an electrical signal and in logic circuits it is interpreted into digital information. With the LCD technology the identification of contact points can be realized by different known methods, which for instance are based on the absorption of acoustic surface waves in the contact point, on infrared transmission and reception, on a change in the capacitance and a resulting change in frequency, on a change in pressure caused by the contact which is detected by a strain gauge or a piezoelectric transducer, on mechanical switch designs, and so on. One possibility is also to use the change of the magnetic field or the electromagnetic resonance to detect the point of contact.

Figures 2 and 3 illustrate a pen computer application presented in our patent application FI-941629 (the application's figures 1 and 3b, respectively). Figure 3 shows a mobile phone 31 and a display comprising layers 32, 33 on top of another. The display also extends under the virtual keys 35. A permanent keyboard is located at 36. In this invention the pointing with the pen at a desired key location is aided by a sheet 34 provided with holes. In figure 2 it is shown in section, and its surface 11 has recesses 12, into which a pen is easily directed. A push with the pen 14 activates the transducer 13. In this case the transducers could be realized by keys in different technologies, such as mechanical miniature keys, membrane keys, or digitizing points on a digitizing pad or touch screen.

For instance an electromagnetic resonance method could be used when the above transducer is realized, see figures 4 and 5. Then the pointing device, the pen 51, receives its operating power through the electromagnetic radiation created by the varying inductive field of the sensor table 41 and stores the energy in its own coupling circuit 52. The surface of the sensor table 41 is e.g. the glass sheet of an LCD display, and the electromagnetic radiation is created by resonant circuits under the display sheet 41, which are supplied by any suitable signal processing circuit 45. The resonant circuit 42 comprises a main capacitor and a coil. The pen 51 includes a resonant circuit 52 comprising a coil and a capacitor, whereby this circuit receives, stores and discharges a signal at the same frequency which it received from the sensor plate. When the display surface 41 is touched with the pen 51, the capacitance of the pen's electrical circuit will change, causing a mutual change both in the received and in the transmitted signal. This causes a phase shift in the resonance frequency. The position of the pen 51 on the screen 41 is determined with the aid of the signal strength.

The above presented pen 51 can also include a lateral switch, which can be used to start a predetermined function in the receiving device 41. The state of the lateral switch can be detected e.g. by a change in the phase shift and/or in the frequency.

In order automate data acquisition we know various equipment, of which we could mention scanners, for instance hand-held scanners, and bar code readers. A typical scanner assembly comprises the actual reader device, or a device which reads pictures and/or text and encodes them into an electrical signal, and further a cable and an interface card, through which the signal containing the scanned information is transformed into a form which can be processed e.g. by a computer. Alternatively the cable could be connected to a microcom-

puter's serial or parallel port through which the scanned information is read into the computer. In many cases the signal generated by the scanner is processed as such, in a bit map form. On the other hand the signal can be processed by a suitable program which detects the pixel position information generated by the scanner and combines these pixels in a suitable way to generate either simple lines or preferably e.g. characters. Character recognition programs have been developed into quite versatile programs, and now there are programs on the market which automatically can recognize different fonts and which can be "taught" to recognize different handwritings.

Bar code readers are quite widely used, for instance at shop check-outs where product information and prices are read and entered from the scanner through a cable/wire interface to the check-out computer. In the industrial production and storage there are also different identification tasks where bar code readers are used. One typical application of a hand-held bar code reader is stocktaking, whereby a person performing the stocktaking with the aid of a reader identifies the contents of bar code stick-on labels fastened on the products and/or product packages. The collected information is stored in the memory of the bar code reader, and when the stocktaking is ended the data stored in the reader is discharged through a suitable cable interface to a microcomputer with a storage bookkeeping program, into which the collected data is entered. In addition to the mechanical connections the user must usually perform operations related to a microcomputer program, for instance enter instructions through a separate keyboard so that the collected data can be stored in the correct memory position determined by the program.

In accordance with a first aspect of the invention there is provided a method for transferring information between a pointing device and a functional device comprising user interface means such as a display provided with an active surface area, whereby **(a)** the pointing device is operably disposed with a selected position on the surface area; and **(b)** the selected position is detected through a change occurring in a first physical interaction between the pointing device and the selected position on the surface area characterized in that **(c)** information is transferred from the functional device to the pointing device through a second physical interaction by modulating the information on this second interaction and/or **(d)** information is transferred from the pointing device to the functional device through a third physical interaction by modulating the information on this third interaction.

In accordance with a second aspect of the invention there is provided a pointing device for apparatus having an active surface display, comprising a control means, a memory means, a position sensing means for sensing the position of the positioning device relative to the active display, and wireless communication means for transferring information between the positioning device and the apparatus.

In accordance with a third aspect of the invention there is provided apparatus having an active display and adapted for wireless communication with a pointing device, the apparatus comprising a display including an active surface, wireless communication means for receiving and transmitting information between the apparatus and the pointing device, and data processing means including memory means and a display driver for processing information received from a pointing device.

In accordance with an embodiment of the invention the pointing device and the functional device include means with which the data collected in the pointing device is transferred to a selected position on the functional device's surface area, particularly on a display. Information can also be collected from a selected surface area to the pointing device. A first physical interaction is used to position the pointing device, a second physical interaction is used for any information transfer from the functional device to the pointing device, and a third physical interaction is used for information transfer from the pointing device to the functional device. These interactions can also be partly or wholly the same physical interaction on which the desired information is modulated.

Any positioning method known per se could be used to position the pointing device, such as one of the methods mention above in connection with the touch screens. Preferably a method based on electromagnetic resonance is used for the positioning as well as for the information transfer. Then the pointing device, for instance in the form of a pen, may contain a first resonant circuit for the positioning of the selected point and a second, or the same, resonant circuit through which information is transferred from the pen memory to a resonant circuit in the display. Preferably the resonant circuits can be used so that the energy required for the operation of the pen is received with the aid of the pen's resonant circuits from the display resonant circuit. The display can be an LCD display, which in a way known per se from touch screens includes a resonant circuit formed by a transmit and receive antenna, and decoding and demodulating units which control the function and detect the received information.

The device receiving information from a pointing device with the transfer method in accordance with the invention is preferably a pen computer or a mobile station, particularly a mobile phone.

Below the invention is described in more detail with the aid of embodiment examples and with reference to the enclosed drawings, of which figures 1 to 5 were described above with reference to prior art, and in which:

figure 6 shows the basic structure of a combination comprising a pointing device or a pen and a functional device or a pen computer which use the information transfer method in accordance with the invention;

figure 7 illustrates the function known per se of a display embodying an information transfer method based on resistivity change; and

figure 8 shows a simplified block diagram of an operation mode of the transfer method in accordance with the invention.

Figure 6 shows a situation which employs apparatus and the information transfer method in accordance with the invention. The figure shows a combination comprising a pen 51 and an LCD display 41 for information acquisition, storage and display. The collected information is first transferred to the pen where it is temporarily stored, and then it is transferred to the pen computer, in which the collected data is presented on the display.

The pointing device or the pen 51 receives through an interface, not shown, information acquired e.g. by a scanner. The collected information is stored in a memory unit 55. The functions of the pen are controlled by a control unit 54, which controls the memory and also the encoding and modulating unit 56. A positioning resonant circuit 52 interacts in a way known per se with a transmit and receive antenna 42 under the display's surface 41 and the LCD display unit 43. The resonant circuit 52 comprises a main capacitor and a coil, and it receives from the display the energy required for its operation.

Thus the coil and the capacitor function as a resonant circuit 52, which receives, stores and discharges a signal at the same frequency which the resonant circuit below the display transmitted. When a person now uses the pen 51 and touches the surface of the display 41 the capacitance of the transducer in the pen's electrical circuit will change, and this causes a change both in the received and in the transmitted signal. This is also evident as a phase shift of the resonance frequency, which is detected by the transmit and receive antenna 42. The position of the pen on the screen is positioned with the aid of the detected signal strength. When the pen is provided with a lateral switch in order to trigger the information transfers described below, the state of the switch can also be detected based on the phase shift and frequency change in the signal returning to the display. Alternatively the information transfer could be activated automatically, when it is detected that the pen touches the display surface.

The pen also has a second resonant circuit 53 for information transfer. The resonant circuit 53 also receives the electromagnetic oscillation from the display, and when suitably dimensioned, a resonant oscillation is created in the circuit in synchronization with the received oscillation. The lateral key (not shown) triggers the information transfer from the pen. Controlled by the control unit the encoding an modulating unit 56 reads information stored in the memory 55. The information is encoded and this encoded information is used to modulate the frequency of the resonant circuit 53. The modulated signal radiates from the pen 51 to the display 41. Information can be transferred from the display to the pointing device in a corresponding way. For positioning and information transfer the pointing device can use separate resonant circuits or perform several functions with the same resonant circuit.

Any method known per se can be used for the modulation, e.g. frequency modulation (FM), pulse code modulation (PCM), or quadrature phase shift keying (QPSK).

The transmit and receive antenna 42 receives the modulated oscillation and this is supplied to the signal processing unit 45. There is first a transmitter/receiver unit 46 e.g. for amplification of the signal, and then the signal is demodulated and decoded in the unit 47. The decoded signal is supplied to the logic, which suitably is a microprocessor 48. The signal is processed by programs in the microprocessor, and on the basis of the results from the processing the microprocessor 48 controls the display driver 44 to present an acknowledgment signal in a position defined by the program.

Signal processing in the microprocessor 48 is preferably invisible to the user, so that information transferred from the pen is displayed as such in the position selected with the pen. Then the user perceives the operation as if the information stored in the pen would be "dropped" at the selected position on the display.

A method in accordance with the invention can also be realized as a method based on magnetism. Then the pointing device contains no receive circuit, but the energy required to generate and modulate the transmit signal is supplied by a battery or other suitable energy source connected to the pointing device.

Light waves, particularly infra-red waves can also be used in the information transfer. Then the pointing device and the functional device include optical transmitter and receiver components. In the functional device the optical device can be located in edge of the display panel, whereby the pointing device can be used in separate actions, first to select a surface area on the screen, and then the pointing device can be moved to the optical component where the information is transferred.

The display can also be a display reacting to contact force, e.g. a touch screen based on resistivity. Figure 7 illustrates the basic operation of a display of this kind containing layers under the screen, in which the resistivity changes due to a weight applied to the screen surface. The figure (a) on the left shows how the contact is detected in the vertical direction (Y direction). The edge y1 of the first resistive layer at the screens' top edge is connected to the supply voltage V, and correspondingly the bottom edge y2 is connected to ground. When a point P on the screen is touched by a pointing device or a pen the resistances R1 and R2 between this point and the edges y1 and y2, respectively, will change. This change is detected in a way known per se. In a corresponding way the figure (b) on the right shows detection of a horizontal (X direction) contact. The voltage V is connected to the left edge. The change in the resistanc-

es R3 and R4 between the point of contact P and the edges is detected.

When a resistivity based touch screen is used, then the pointing device such as a pen does not need the positioning system or the circuit 52 shown above in figure 6, but the point of contact is detected solely as resistance changes in the screen. Instead of the circuit 53 in figure 6 we must use a circuit which generates mechanical oscillations (not shown). The mechanical oscillations are detected as modulated resistance variations in the screen. A person skilled in the art understands that the function can be similar to that described above in connection with the resonance method. In this case the simplest way to trigger the transfer is to use a lateral switch in the pen. The pen must have an energy source of its own to transmit the modulated oscillation signals to the display, because no energy can be transferred from the display to the pen in the method based on resistivity. Neither is it possible to transfer information from the display to the pen in the method based on resistance changes.

Another way to realize an apparatus and method in accordance with the invention is considered with the aid of figure 8. Here we assume that information is transferred through electromagnetic resonance from the pointing device to the receiving device.

The information to be transferred or the desired information I is collected with a hand-held scanner or another corresponding device to the pen pointer 51'. The scanner can be a bar code scanner, a character scanner or a picture scanner, or any other data acquisition device. The scanner can of course also be integrated in the pointing device 51, so that we obtain a combined scanner-pen. Then of course the scanner must have a power supply of its own.

The pen 51 is used to point at that position on the screen 41 where the collected information is to be transferred. The information transfer is started e.g. by pressing a button or lateral switch A on the pen. There can also be an automatic triggering when the pen touches the screen, or when the pen is sufficiently close to it, as was mentioned above.

The oscillating circuit in the pen begins to oscillate at a frequency determined by the oscillating circuit. The pen receives energy from the electromagnetic radiation transmitted by the receiving device, such as the transmit antenna 42 in figure 6.

In order to transfer the information it is modulated in the information input devices 53 - 56 using known modulation methods. The position information is either modulated on the same frequency or alternatively a separate resonant frequency is used to transfer the position information. The contact surface of the screen, the antenna or the sensor 42, 46 receives the modulated signal and directs the signal to a decoding unit 48. The position information L of the pointing device is also transmitted to the data processing unit.

The collected data is processed in the data processing unit 48 by a transformation and processing program T, know per se. The transformation can be for instance a conversion algorithm used in telefax programs, which converts the signal from the telefax format into an ASCII code. Then the processed information D is transferred with the position information to the display driver 44, which outputs the information in the position on the display 43 which was pointed out by the pen.

In the case of figure 8 the end result is that the information acquired by the user is transferred to the selected place on the display. Then the user can process the information in a desired way according to the possibilities of the processing programs T. In this way the user can easily transfer the collected data directly to a place pointed out on the display. The transfer method is wireless, and the different intermediate steps, such as the data processing, are invisible to the user.

The information on the screen can also be collected to the pointing device in a corresponding way as was described above for the information transfer from the pointing device to the screen. Then it is possible to collect information with the pointing device from the screen and move it to another place. It is also possible to move the information from the screen of one device, e.g. from a pen computer, to the screen of a second device, e.g. a mobile phone, to be further processed.

Here we presented only a few currently preferred ways to realize embodiments in accordance with the invention. As we mentioned in the introduction, the touch screens can be realized by many different methods and in many different ways, and it is also possible to implement these method in the invention. Examples are e.g. ultrasonic, infra-red, acoustic, light, etc. The pointing device or the pen is of course realized so that it is compatible with the method used in the functional device.

While we here considered primarily pen computer applications, embodiments in accordance with the invention are well suited to be used in a mobile phone. Then it is also conceivable that the user reads a telephone number from his notebook with a small pen scanner and then "places" it on the screen, so that the telephone can then call the number dialed in this way. It is further conceivable that the mobile phone is provided with a suitable data communications program, so that information, for instance a picture or text, collected with a hand-held scanner and entered on the telephone's screen is then transferred from the mobile phone over the radio link to any receiving device.

Of course there is nothing that prevents the presented method to be used in larger monitors and digitizing tables.

The scope of the present disclosure includes any novel feature or combination of features disclosed therein either explicitly or implicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed by the present invention. The applicant hereby gives notice that new claims may be formulated to

such features during prosecution of this application or of any such further application derived therefrom.

Claims

1. A method for transferring information (I) between a pointing device (51) and a functional device (41) comprising user interface means such as a display provided with an active surface area (43), whereby:

   (a) the pointing device (51) is operably disposed with a selected position on the surface area (43); and

   b) the selected position is detected through a change occurring in a first physical interaction (52, 42) between the pointing device (51) and the selected position on the surface area (43); characterized in that

   (c) information (I1) is transferred from the functional device to the pointing device (51) through a second physical interaction (53/42) by modulating the information on this second interaction (53/42); and/or

   (d) information (I2) is transferred from the pointing device (51) to the functional device (41) through a third physical interaction (53/42) by modulating the information on this third interaction (53, 43).

2. A method according to claim 1, characterized in that two or three physical interactions of the first, second and third physical interactions are partly or wholly the same physical interaction.

3. A method according to claim 1 or 2, characterized in that the information transfer of step (c) and/or step (d) is through a selected position on the surface area.

4. A method according to any previous claim, characterized in that one or more of said physical interactions are an electromagnetic resonance interaction between the resonant circuit (42) of said surface area and the resonant circuit (52) of the pointing device.

5. A method according to any previous claim, characterized in that the energy required by the pointing device is transferred from the functional device.

6. A method according to claim 6, characterized in that the operating energy for the pointing device is transferred through the first, the second or the third physical interaction.

7. A method according to claims 4 or 6, characterized in that the operating energy for the pointing device is received by a resonant circuit (52, 53).

8. A method according to any previous claim, characterized in that the change in the first physical interaction is the change of said surface area's resistivity (R1 - R4) caused by the mechanical contact of the pointing device.

9. A method according to any previous claim, characterized in that the third physical interaction is the modulated change of said surface area's resistivity (R1 - R4) caused by the pointing device acting with a mechanical contact which is modulated by said information.

10. A method according to claim 8 or 9, characterized in that the energy for the mechanical modulation is supplied from an energy source arranged in the pointing device.

11. A method according to any previous claim, characterized in that the second and/or the third physical interaction is a light wave, e.g. an infra-red wave, which is transmitted between an optical transmitter and an optical receiver connected to the user interface means of the functional device and to the pointing device.

12. A method according to any previous claim, characterized by the steps in which:

   - the pointing device is positioned at a selected position on the surface area;
   - the selected position is determined through the interaction between the pointing device and the surface area;
   - the information connected to the selected place on the surface area is transferred to the memory of the pointing device;
   - the pointing device is positioned at a selected position belonging to the same functional device or to another functional device;
   - the selected position is determined through the interaction between the pointing device and the surface area; and
   - the information stored in the memory of the pointing device is transferred through the third physical interaction.

13. A method to transfer information according to any previous claim, characterized by the steps in which:

(1) the information (I) to be transferred is collected into the memory (55) of the pointing device;

(2) a selected point on the display (43) acting as the receiving surface area is pressed with the pointing device (51), whereby the interaction between the pointing device and the screen indicates the pressed point, and whereby the indication result is stored in a first memory position (48) of the functional device (41);

(3) the control logic (54) of the pointing device (51) reads the information (I) in its memory, encodes and/or modulates (56) with this information the signal of the second physical interaction between the pointing device and the display, whereby the signal is transferred to the selected point of the display (41, 43);

(4) the receiving means (42, 46) of the display receive and demodulate and/or decode (47) the transferred signal, and then the demodulated information is stored in a second memory position (48) of the functional device;

(5) the logic (48) of the functional device joins the information in the first and second memory positions with the aid of a program (T) stored in its memory, processes the information with the aid of the program (T), and controls the display driver (44) to display acknowledgment information according to the program in a position (43) determined by the program; and then

(6) the pointing device (51) in raised from the display (43) and the information transfer is ended.

14. A method according to claim 13, characterized in that the acknowledgment information is partly or wholly the transferred information.

15. A method according to claim 13 or 14, characterized in that the point on the display (43) determined by the program is the selected point pressed by the pointing device (51).

16. A method according to any previous claim, characterized in that the transfer of information (I, I1, I2) from the functional device to the pointing device and/or from the pointing device to the functional device is started by the trigger function (A) of a switch means mounted in the pointing device or in the functional device.

17. A method according to any previous claim, characterized in that the transfer of information (I, I1, I2) from the functional device to the pointing device and/or from the pointing device to the functional device is started when the pointing device has touched the surface area, or when the functional device has determined the position on the surface area where the pointing device is located.

18. A combination of a pointing device (51) and a display (41) embodying the method according to any previous claim 1 - 7, 11 - 17, characterized in that

- the pointing device (51) contains a control unit (54), a memory unit (55), an encoding and modulating unit (56), and controlled by the encoding and modulating unit on one hand a resonant circuit (52) for positioning the contact point and on the other hand a resonant circuit (53) for transmitting and/or receiving energy and modulated information; and that

- the display (41) has a contact surface containing a transmit and receive antenna (42), a control unit (46) for the transmission and reception, an encoding and demodulating unit (47), and a data processing unit (48) having a memory and a driver (44) for the display (43).

19. A combination of a pointing device and a display embodying the method according to any previous claim 1 - 17, characterized in that

- the pointing device comprises a control unit, a memory unit, an encoding and modulating unit, and a mechanical oscillating circuit controlled by the modulating unit, and that

- the display comprises a contact surface and a layer in this surface which detects a change of resistivity, a reception control unit, a decoding and demodulating unit, and a data processing unit having a memory and a display driver.

20. A method according to any previous claim, characterized in that said surface area comprises the display (41, 43) of the pen computer or mobile phone acting as the functional device.

21. A pointing device for apparatus having an active surface display, comprising

a control means,

a memory means,

a position sensing means for sensing the position of the pointing device relative to the active display, and

wireless communication means for transferring information between the pointing device and the apparatus.

22. Apparatus having an active display and adapted for wireless communication with a pointing device, the apparatus comprising a display including an active surface, wireless communication means for receiving and transmitting information between the apparatus and the pointing device, and data processing means including memory means and a display driver for processing information received from a pointing device.

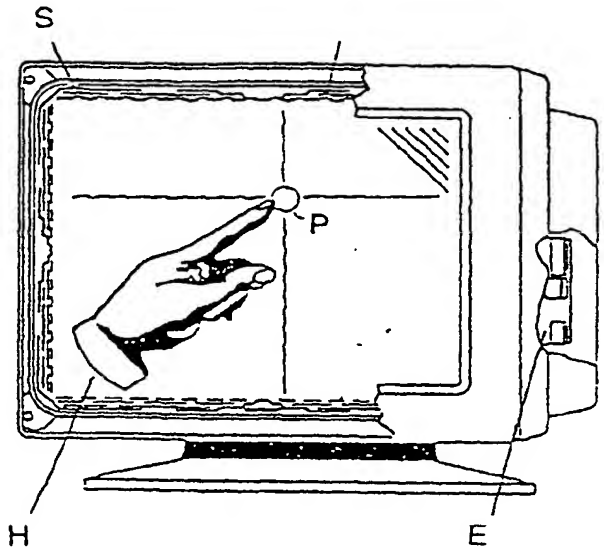

Fig. 1

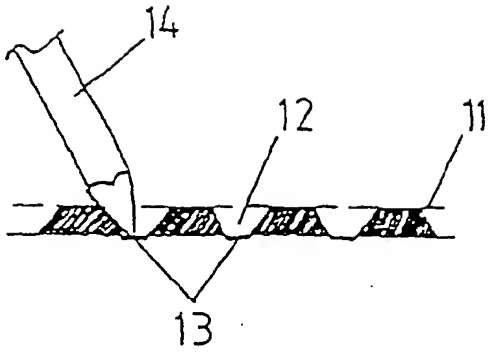

Fig. 2

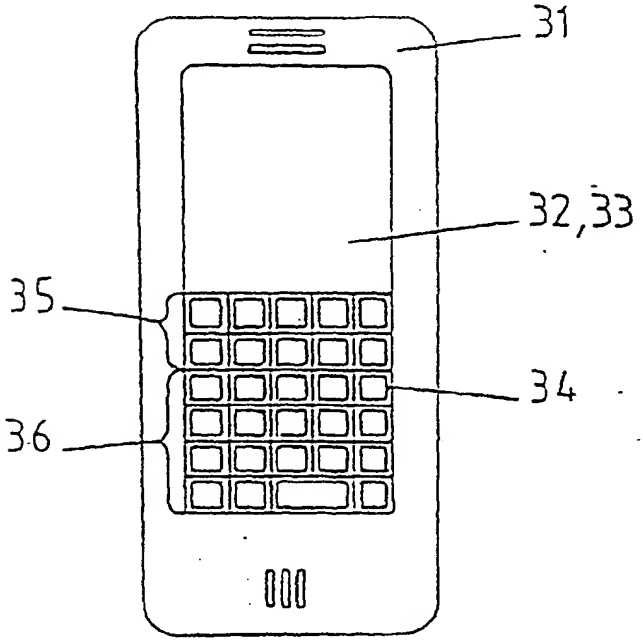

Fig. 3

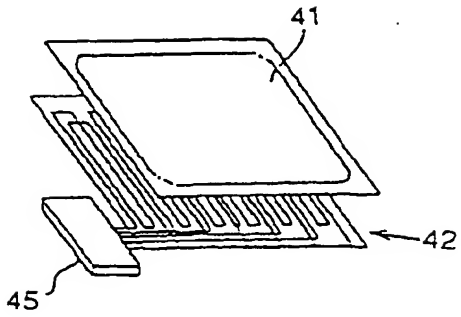

Fig. 4

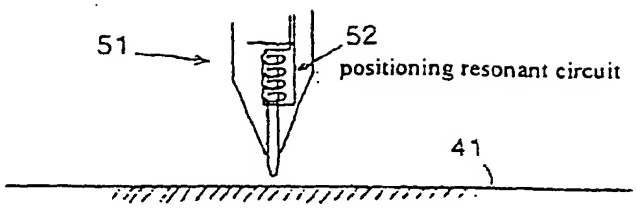

Fig. 5

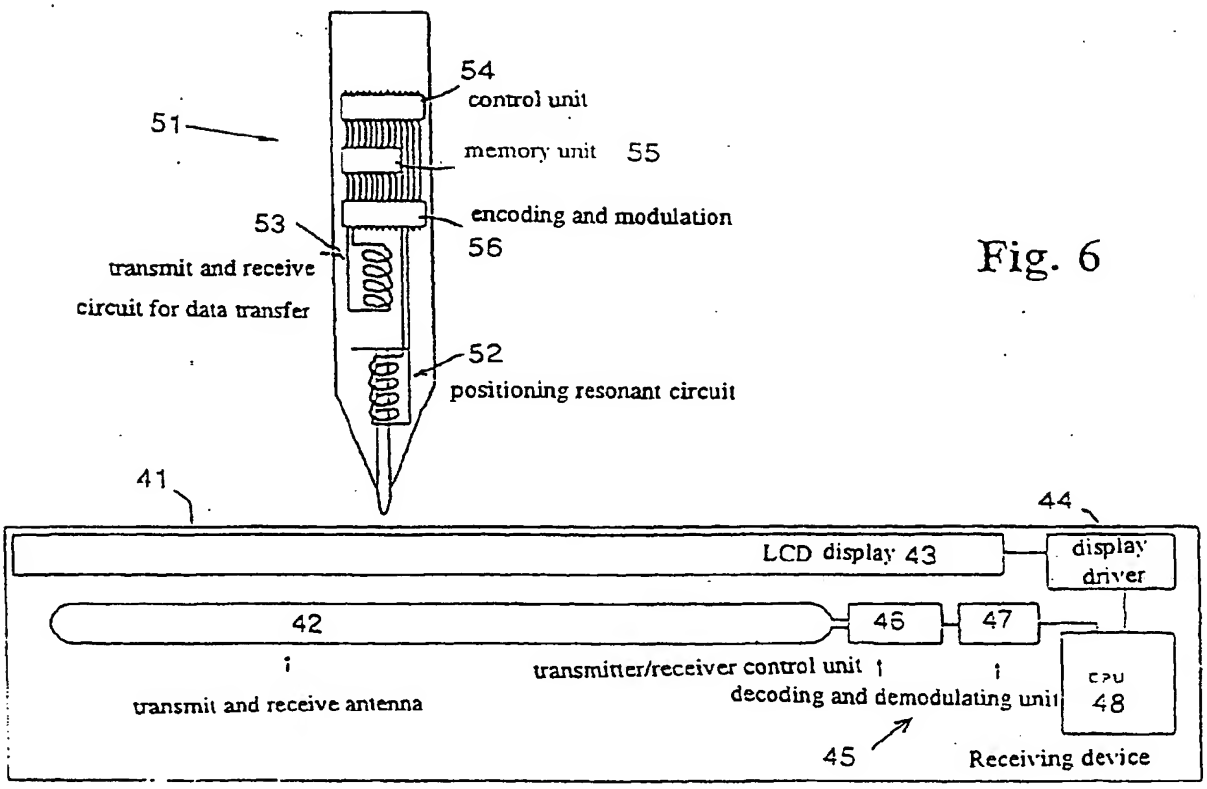

Fig. 6

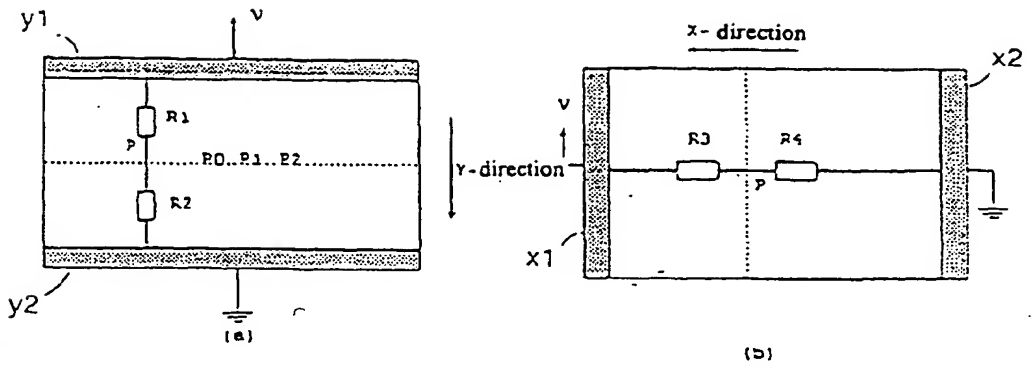

Fig. 7

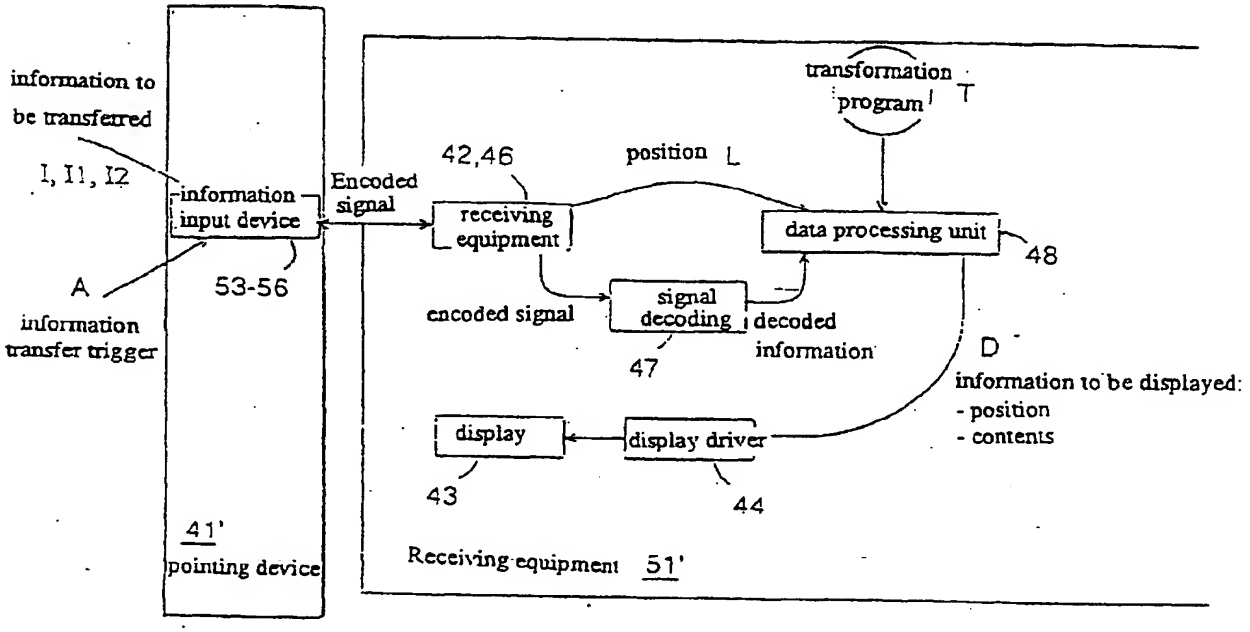

Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 9339

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	EP-A-0 622 724 (IBM) 2 November 1994 * column 18, line 32 - line 45; claims 1,2; figures 1,3A *	1-4,21, 22 8,12,13, 16-20	G06F3/033 G06K11/18 G06K11/12
X A	WO-A-93 08559 (ELECTRONIC INK) 29 April 1993 * page 1, line 25 - line 34; claims 1,2,6-8,24,25; figures 7,8 *	1-3,8, 11,21,22 12,13, 19,20	
A	WO-A-92 21082 (EDEN GROUP LTD) 26 November 1992 * page 4, line 27 - line 34 * * page 8, line 9 - line 18; claims 1,3,11-13 *	1-5,8, 12,13, 18-20	
A	FR-A-2 248 558 (SIEMENS AG) 16 May 1975 * claims; figures *	1-4, 11-13, 16-22	
A	EP-A-0 581 591 (IBM) 2 February 1994 * column 4, line 41 - column 5, line 9 * * column 6, line 12 - column 7, line 11; figures 3-5 *	1-4, 12-22	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G06F G06K
A	EP-A-0 347 725 (WACOM CO LTD) 27 December 1989 * claims 1,10; figures 4,7 *	1-7	
A	EP-A-0 288 692 (IBM) 2 November 1988 * abstract; claim 1 *	8	
A	EP-A-0 544 278 (CANON KK) 2 June 1993 * abstract; figures 2,14,15 *	9,10	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	13 February 1996	Durand, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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